BICSD

CONCORD INSTRUMENT
DIVISION

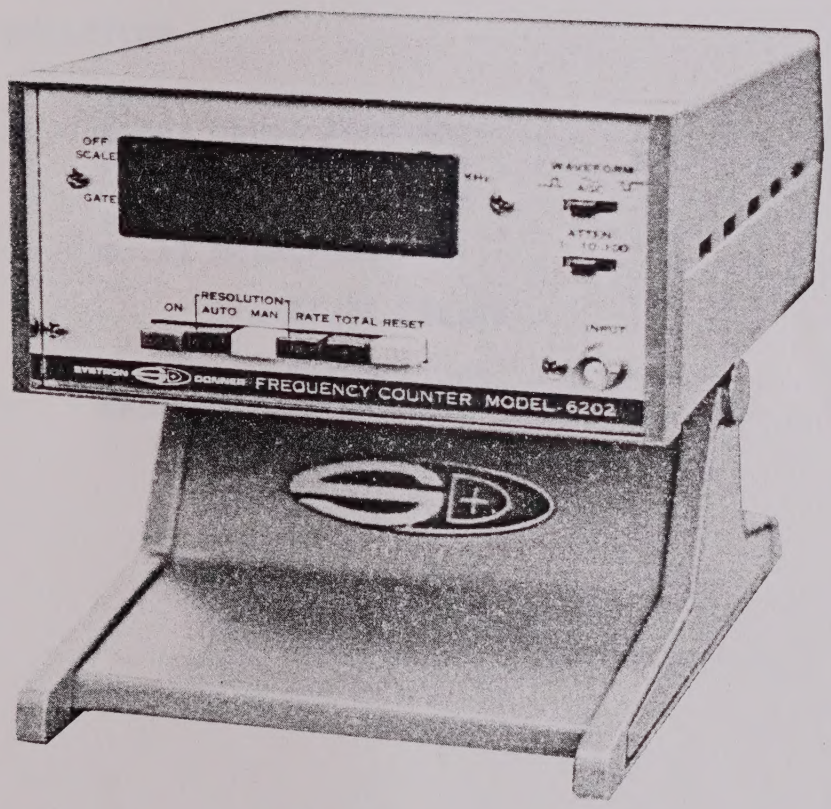
MODEL 6202

FREQUENCY COUNTER

SYSTRON DONNER

Concord Instrument Division

INSTRUCTION MANUAL



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SYSTRON DONNER

TEN SYSTRON DRIVE, CONCORD, CALIFORNIA 94518 U.S.A.
Tel: (415) 682-6161, TWX: 910-481-9479, Cable: SYSTRONDONNER

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CHAPTER 1
GENERAL INFORMATION

1.1 INTRODUCTION

The Systron Donner mini-counter Model 6202 fits all the low-cost counter applications, filling the need for making frequency measurements in industrial plants, on production lines, in school laboratories, in telephone service units, in the field, and in systems.

Automatic gain control (AGC) and autoranging provide a simple automatic "hands off" operating technique with direct digital readout as a major benefit. This elimination of manual input adjustments results in faster and easier frequency measurements. Furthermore, personnel not accustomed to taking frequency measurements can use this mini-counter with the same ability as trained operators.

The AUTOranging RESOLUTION fills the display register within time base limits while automatically selecting maximum frequency resolution. By pushing the MANual switch, the operator can manually select measurement readings with resolutions in four decade steps. By activating the TOTALize switch, the counter will totalize counts over an indefinite period. Starting or stopping any measuring mode can be affected manually by the operator or by remote control.

The Model 6202 Frequency Counter comes with a group-serial 4-bit BCD output. This standard feature and the full complement of rear panel connectors (Reset, External Gate, INTernal Oscillator/ EXternal Oscillator) make this mini-counter a powerful and versitile systems compatible unit.

The readout is a highly reliable, seven segment, and parallax free display. This readout of five standard and two optional digits features zero suppression which blanks out the leading zeros for easier measurement comprehension.

1.2 SPECIFICATIONS

FREQUENCY MEASUREMENT (RATE)

Range	20 Hz to 200 kHz.
Sensitivity	25 mV rms.
Resolution	0.1 Hz to 100 Hz in decade steps.
Accuracy	±1 count ±time base accuracy.
Reads In	kHz with autopositioned decimal point.

TOTALIZE (TOTAL)

Rate Limits	20 Hz to 200 kHz.
Register Capacity	10^5 events.
Totalize/Hold	Manual-Front panel TOTAL push-button.

INPUT CHARACTERISTICS

Input Impedance	1 MΩ shunted by 25 pF.
Coupling	ac
Attenuation	Step attenuator with factors of x 1, x 10, x 100.
Maximum Input (without damage)	500 V peak (dc + ac component). 250 V rms, 20 Hz to 10 kHz; 50 V rms, 10 kHz to 200 kHz.

STANDARD TIME BASE

Aging Rate	±3 parts in 10^7 per month.
Temperature Stability	±5 parts in 10^6 from 0 to 50°C; typically ±2 parts in 10^6 from 20° to 40°C.
Line Voltage	±1 part in 10^7 for 10% line variation.
External Input	100 kHz to 10 MHz, 1 V rms into 500 Ω.

GENERAL

Display	5 digits standard (7 digits optional).
Display Storage	Provides continuous display of last reading.
Dimensions	3 1/4" H x 7" W x 8 1/8" D.
Weight	5 lbs, net; 7 1/2 lbs shipping.
Power	100, 115 or 200, 230 V (±10%), 48-440 Hz, 6 W.

1.3 OPTIONS

Option	Description
06	Battery Pack - 4 hour operating cycle with built-in recharging circuit. Increases height to 7 inches.
07	DC Operation - Permits operation from external dc power source of +5.5 to +7.5 Vdc @ 2 A with the addition of an internal power inverter.

Option	Description
08	Time Base Oscillator - Improves time base temperature stability to ±1 part in 10^6 from 0 to 50°C.
09	Time Base Oscillator - Improves time base temperature stability to ±3 parts in 10^7 from 0 to 50°C. (Not available with Battery Option 06.)
16	Additional Readout Digits - Adds two (2) readout digits to display.
35	BCD Conversion Cable - Converts group-serial BCD outputs from the Model 6202 into standard 8-4-2-1 parallel format, including decimal and legend units. Compatible for use with the Systron-Donner Model 5103 Digital Printer.

CHAPTER 2
INSTALLATION

2.1 INTRODUCTION

The SD Model 6202 Frequency Counter is shipped in an operational condition and is essentially ready for use as received. This chapter outlines the procedures for initial inspection and installation of the instrument. Instructions for reshipment are also included should the unit be returned to Systron-Donner Corporation for service or repair.

2.2 RECEIVING INSPECTION

Prior to accepting the counter from the shipper, inspect the condition of any shipping container for any indication of freight damage. Any sign of such damage must be noted by both the shipper and receiver and should be reported to the insurance investigator.

Immediately following removal of the instrument from the shipping carton, inspect for possible physical damage incurred during shipment. Check surfaces for scratches or dents and note condition of controls and connectors. Should any damage be noted, notify your nearest Systron-Donner representative---DO NOT USE THE COUNTER UNTIL INSTRUCTED TO DO SO BY THE REPRESENTATIVE.

2.3 RESHIPMENT

When the instrument is to be repackaged for shipment use the original packing materials. Your Systron-Donner field office can provide materials similar to those used for the original factory packaging, or repackage the instrument following these general instructions:

GENERAL PACKING INSTRUCTIONS

1) Attach a tag to the unit indicating the model number, serial number, name and address of the instrument owner, and a summary of the service or repairs required.

2) Wrap the instrument in heavy paper or plastic prior to placing it into the shipping container.

3) Select a strong carton or wooden box to house the instrument.

4) Use an adequate layer of shock-absorbing material on all sides of the instrument and protect the front panel with additional layers of cardboard. Be certain that there is no movement of the unit within the container.

5) Seal the package with strong tape or metal bands.

6) Mark the shipping container "FRAGILE-DELICATE INSTRUMENT" to ensure careful handling.

7) Be certain that all correspondence refers to full instrument nomenclature (model and serial number).

2.4 POWER REQUIREMENTS

The Model 6202 Frequency Counter is supplied with a standard three-conductor power cord which, when plugged into an appropriate power receptacle, grounds the chassis to protect operating personnel from certain electrical hazards. Whenever the power cord is mated to a two-conductor outlet, a cord adapter plug (properly installed) will provide the same protection.

The instrument operates from either 100, 115, 200, or 230 V at 48 to 440 Hz and consumes approximately 5 W of power. Taps on the primary of the power transformer are provided to accommodate these power line requirements.

CHAPTER 3
OPERATION

3.1 INTRODUCTION

The Model 6202 operational discussion includes a functional description of the front and rear panel controls, connectors and indicators along with a stepwise operating procedure. The unique AGC and autoranging provided by this mini-counter greatly simplifies measurement operation.

3.2 FRONT PANEL FUNCTIONS

The following Table, 3.1 Front Panel Functions, describes the controls, connectors, and indicators on the front panel of the Model 6202 Frequency Counter.

TABLE 3.1 FRONT PANEL FUNCTIONS

NAME	FUNCTION
ON (pushbutton switch)	This push on push off switch applies power to counter when pushed on.
RESOLUTION-AUTO (pushbutton switch)	This interlocked pushbutton when depressed, placed the counter in autorange.
RESOLUTION-MAN (pushbutton switch)	This interlocked pushbutton manually sequences the desired resolution each time it is depressed.
RATE (pushbutton switch)	This interlocked pushbutton switch selects the frequency mode of operation.
TOTAL (pushbutton switch)	This interlocked momentary pushbutton switch allows totalizing events by depressing this pushbutton to open the gate and to begin totalizing and depressing it again to close the gate to stop the totalizing.
RESET (pushbutton switch)	This momentary pushbutton resets the count chain when depressed.
INPUT (connector)	This BNC connector accepts the input signal to be measured.
ATTEN (slide switch)	1, 10, 100 This slide switch selects either x 1, x 10, or x 100 input attenuation factor. It is not effective in AGC operation.

TABLE 3.1 FRONT PANEL FUNCTIONS (Cont'd)

NAME	FUNCTION
WAVEFORM (slide switch)	⎍, ~AGC, ⎎ This slide switch selects the type of input waveform. Either positive pulses, ⎍ , negative pulses ⎎ or ~AGC sine wave.
Readout/kHz (indicator)	This LED indicator shows the units, (kHz) and mode (RATE) when lighted. It is not lit in the TOTAL mode.
Readout/Digits (indicator)	These seven segment, 5 digit readout tubes display the measurement data with decimal point.
Readout/OFF SCALE (indicator)	This LED indicator lights when the readout exceeds 99999.
Readout/GATE (indicator)	This LED indicator flashes showing the opening and closing of the gate.

3.3 REAR PANEL FUNCTIONS

The following Table, 3.2 Rear Panel Functions, describes the controls and connectors on the rear panel of the Model 6202 Frequency Counter.

TABLE 3.2 REAR PANEL FUNCTIONS

NAME	FUNCTION
Power Plug Socket (receptacle)	This connector socket allows connection of the ac power to operate the counter.
EXT BATT + 6 V - (connectors)	These are the connectors for an external battery when option 07 is installed.
INT/EXT (slide switch)	This switch selects either the INTernal 1 MHz time base or an EXTernal time base applied to the 1 MHz rear input BNC.
BCD OUT (connector)	This P.C. board card edge contains terminals which provide the serial 4-bit BCD information.
1 MHz (connector)	This BNC connector provides an EXTernal time base input.
INPUT (optional connector)	This optional BNC allows rear panel input of the measurement data.

3.4 OPERATING PROCEDURES

There are two operating modes, RATE and TOTAL. RATE allows measurement of frequencies from 20 Hz to 200 kHz and TOTAL allows totalization for a manually selected period of time. Be sure jumpers are correct for the power line voltage.

3.4.1 Rate Measurements

To measure a sine wave or pulsed frequencies from 20 Hz to 200 kHz set the counter controls as follows:

FRONT PANEL

ON	Press on power.
RESOLUTION	Select either AUTO for automatically positioned decimal point, or MAN for manual sequencing the desired resolution.
RATE	Press in.
RESET	Press to reset count chain.
WAVEFORM	Select the desired waveform either positive or negative square wave or AGC sine wave.
ATTEN	Select x 1, x 10, or x 100 input voltage attenuation (not necessary when using the AGC WAVEFORM).
INPUT	Connect the input signal to this BNC.

REAR PANEL

INT/EXT	Set this switch to INT for operation on the internal time base of the counter or set switch to EXT for external time base.
1 MHz	Connect an external time base, 100 kHz to 10 MHz, 1 Vrms into 500 Ω, to this BNC when using the EXT switch position.
EXT BATT + 6 V -	Connect a battery to the + and - 6 V terminals when battery operation is required and the 06 Battery Pack or the 07 DC Operation Options are installed.

3.4.2 TOTAL MEASUREMENTS

This mode of operation allows the input events to be totalized or accumulated. The gate is manually opened and closed by sequential operation of the TOTAL momentary pushbutton switch. Set the

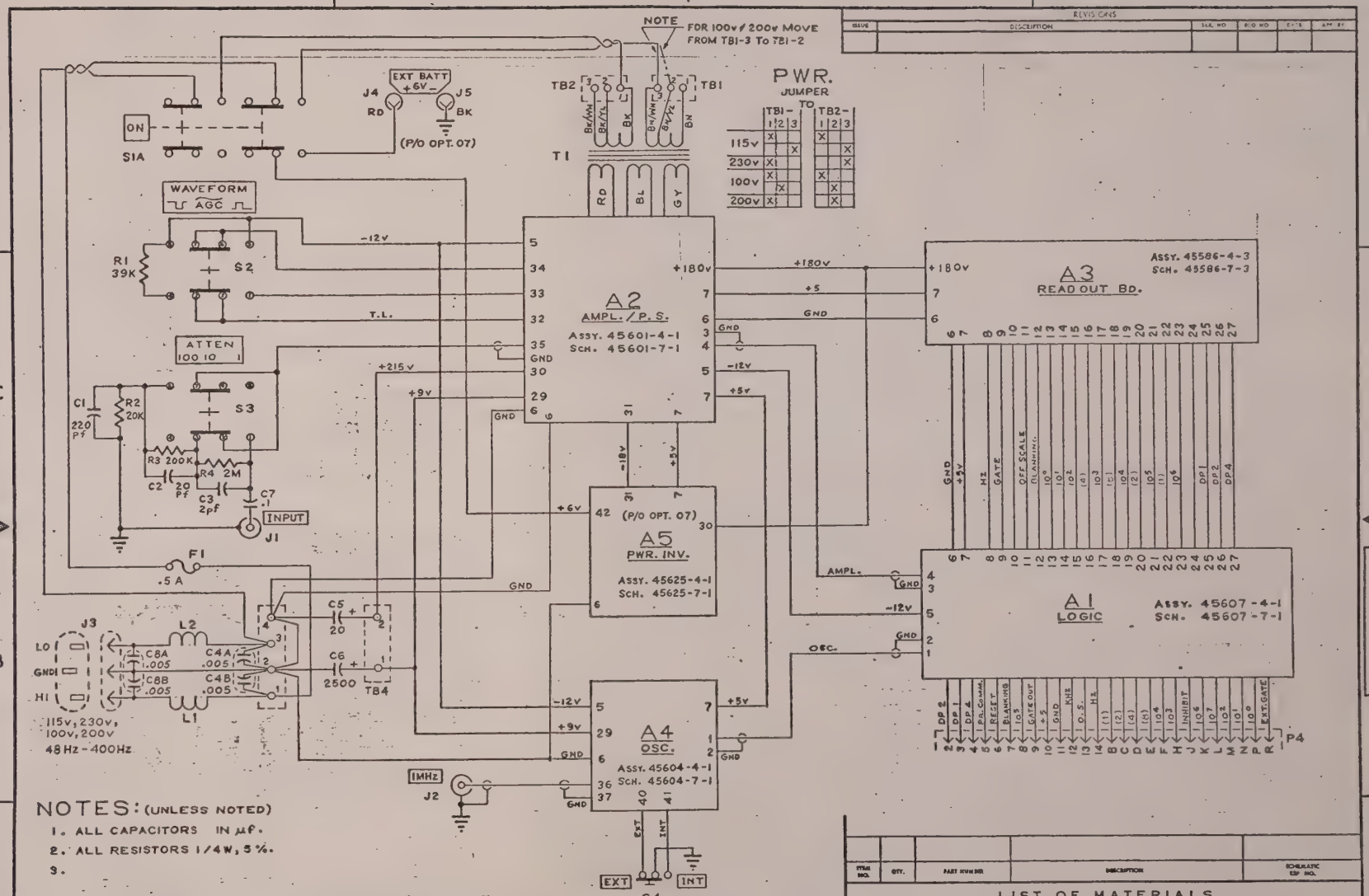
controls for this mode of operation as follows:

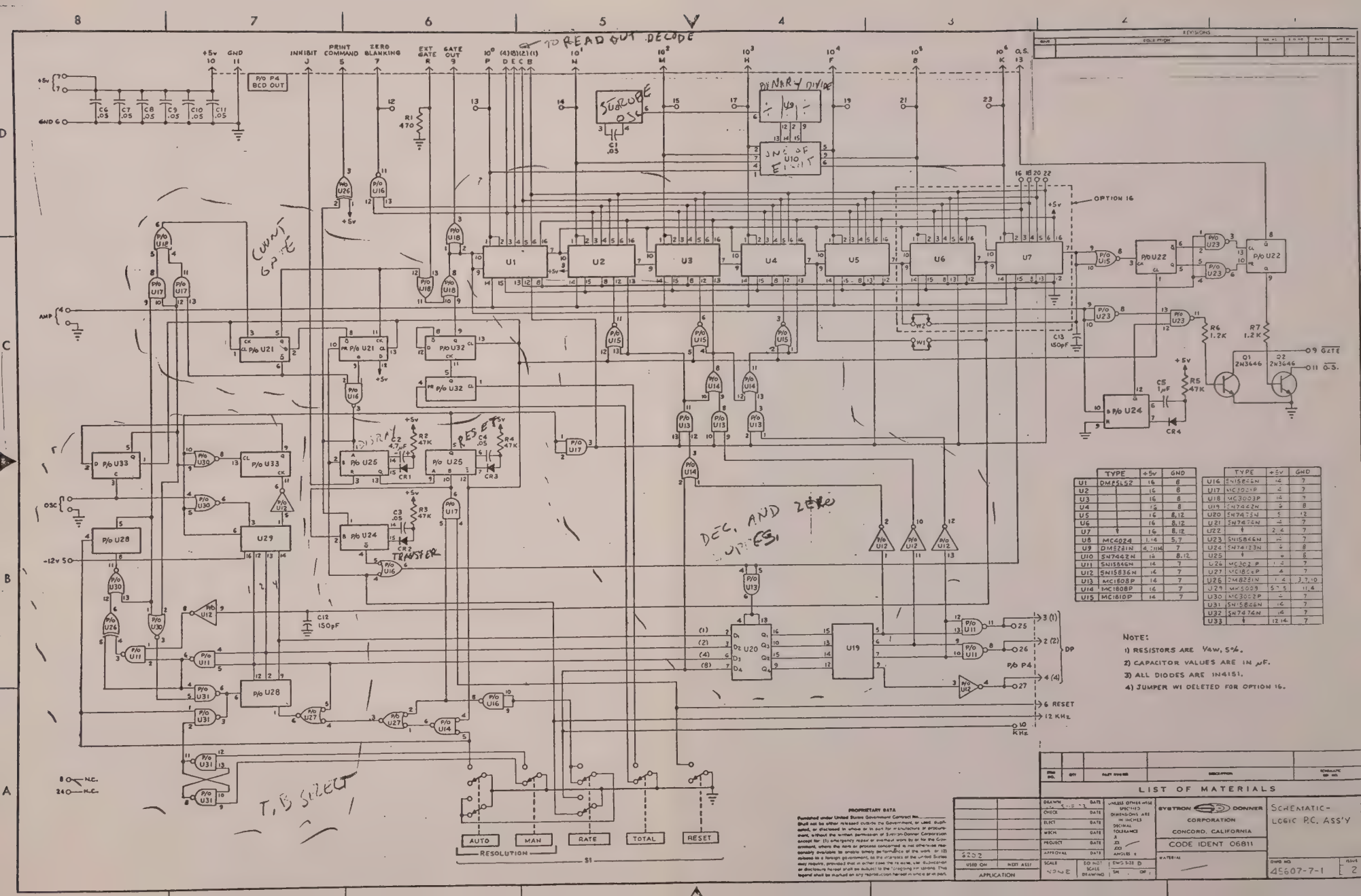
FRONT PANEL

ON	Press on power.
TOTAL	Push in to defeat RATE and to open and close the gate.
WAVEFORM	Select the desired waveform either positive or negative pulses or AGC sine wave.
ATTEN	Select x 1, x 10, or x 100 input voltage attenuation (not necessary when using the $\widetilde{\text{AGC}}$ WAVEFORM).
INPUT	Connect the input signal to this BNC.

REAR PANEL

INT/EXT	Set this switch to INT for operation on the internal time base of the counter or set switch to EXT for external time base.
1 MHz	Connect an external time base, 100 kHz to 10 MHz, 1 Vrms into 500 Ω, to this BNC when using the EXT switch position.
EXT BATT + 6 V -	Connect a battery to the + and - 6 V terminals when battery operation is required and the 06 Battery Pack or the 07 DC Operation Options are installed.


NOTE FOR 100v / 200v MOVE FROM TB1-3 To TB1-2
REVISIONS
ISSUE
DESCRIPTION
ENG NO.
P.O NO.
DATE
APP BY
EXT BATT +6V-
J4 RD
J5 BK
(P/O OPT. 07)
ON
S1A
TB2
TB1
T1
PWR. JUMPER
TO
TB1- 1 2 3
TB2- 1 2 3
115v
230v
100v
200v
WAVEFORM AGC
R1 39K
S2
-12v
T.L.
ATTEN 100 10 1
S3
C1 220 Pf
R2 20K
R3 200K
R4 2M
C2 20 Pf
C3 2pf
C7 .1
INPUT
J1
F1 .5 A
+215v
+9v
GND
A2
AMPL./P.S.
ASSY. 45601-4-1
SCH. 45601-7-1
+180v
+5
-12v
-18v
A3
READ OUT BD.
ASSY. 45586-4-3
SCH. 45586-7-3
GND
+5v
M2
GATE
OFF SCALE
BLANKING
10°
10¹
10²
10³
10⁴
10⁵
10⁶
DP1
DP2
DP4
A5
PWR. INV.
ASSY. 45625-4-1
SCH. 45625-7-1
+6v
(P/O OPT. 07)
AMPL.
A1
LOGIC
ASSY. 45607-4-1
SCH. 45607-7-1
OSC.
P4
J3
LO
GND
HI
L2
L1
C8A .005
C8B .005
C4A .005
C4B .005
C5 20
C6 2500
TB4
115v, 230v, 100v, 200v
48 Hz - 400Hz
A4
OSC.
ASSY. 45604-4-1
SCH. 45604-7-1
1MHz
J2
EXT
INT
54
NOTES: (UNLESS NOTED)
1. ALL CAPACITORS IN µf.
2. ALL RESISTORS 1/4W, 5%.
3.
ITEM NO.
QTY.
PART NUMBER
DESCRIPTION
SCHEMATIC ESP NO.
LIST OF MATERIALS
PROPRIETARY DATA
Furnished under United States Government Contract No.
Shall not be either released outside the Government, or used, duplicated, or disclosed in whole or in part for manufacture or procurement, without the written permission of Systron-Donner Corporation except for: (1) emergency repair or overhaul work by or for the Government, where the item or process concerned is not otherwise reasonably available to enable timely performance of the work; or (2) release to a foreign government, as the interests of the United States may require, provided that in either case the release, use, duplication or disclosure hereof shall be subject to the foregoing limitations. This legend shall be marked on any reproduction hereof in whole or in part.
DRAWN 9/12/72
CHECK
ELECT.
MECH.
PROJECT
APPROVAL
DATE
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
DECIMAL TOLERANCE
X
XX
XXX
ANGLES ±
6202
USED ON
NEXT ASSY
APPLICATION
SCALE
DO NOT SCALE DRAWING
DWG SIZE C
SH 1 OF 1
SYSTRON DONNER CORPORATION
CONCORD, CALIFORNIA
CODE IDENT. 06811
MATERIAL
BLOCK DIAGRAM
FREQUENCY COUNTER
MODEL 6202
DWG NO. 45602-7-1
ISSUE
9/26/72



	TYPE	+5V	GND
U1	DM8551	16	8
U2		16	8
U3		16	8
U4		16	8
U5		16	8,12
U6		16	8,12
U7	↓	16	8,12
U8	MC4024	1,14	5,7
U9	DM8281N	4,7,11	7
U10	SN7442N	16	8,12
U11	SN5546N	14	7
U12	SN15836N	14	7
U13	MC1808P	14	7
U14	MC1808P	14	7
U15	MC1810P	14	7

	TYPE	+5V	GND
U16	SN15864N	14	7
U17	MC3001P	6	7
U18	MC3003P	14	7
U19	SN7442N	5	8
U20	SN7475N	5	12
U21	SN7474N	5	7
U22	↓	2,4	7
U23	SN15864N	14	7
U24	SN74123N	6	8
U25	↓	∞	8
U26	MC362P	1,2	7
U27	MC1810P	4	7
U28	DM8281N	1,4	3,7,10
U29	MC5009	5,7,9	11,4
U30	MC3002P	2	7
U31	SN15866N	14	7
U32	SN7476N	16	7
U33	↓	12,14	7

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LIST OF MATERIALS

DRAWN	DATE	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES DECIMAL TOLERANCE .X ±.03 .XX ±.010 ANGLES ±	SYSTRON DONNER CORPORATION CONCORD, CALIFORNIA CODE IDENT 06811
CHECK	DATE		
ELECT	DATE		
MECH	DATE		
PROJECT	DATE		
APPROVAL	DATE		
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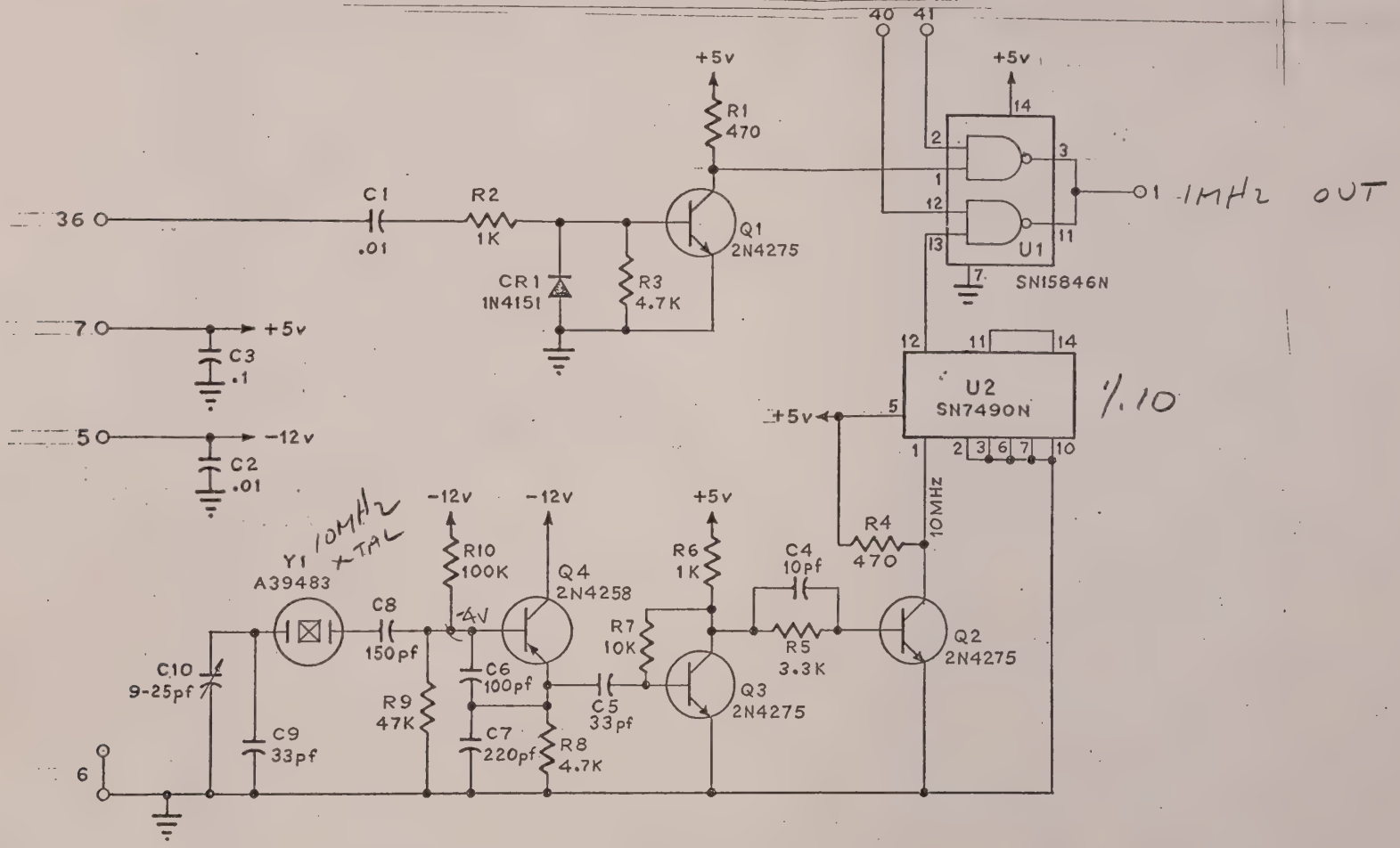

NOTES: (UNLESS NOTED)

1. ALL RESISTORS 1/4W, 5%.
2. ALL CAPACITORS IN μf.

		DRAWN	DATE	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES DECIMAL TOLERANCE .X ±.1 .XX ±.01 ANGLES ±	SYSTRON DONNER CORPORATION CONCORD, CALIFORNIA CODE IDENT 06811	SCHEMATIC, OSCILLATOR PC ASSY.
		CHECK	DATE			
		ELECT	DATE			
		MECH	DATE			
6220		PROJECT	DATE			
6202		APPROVAL	DATE			
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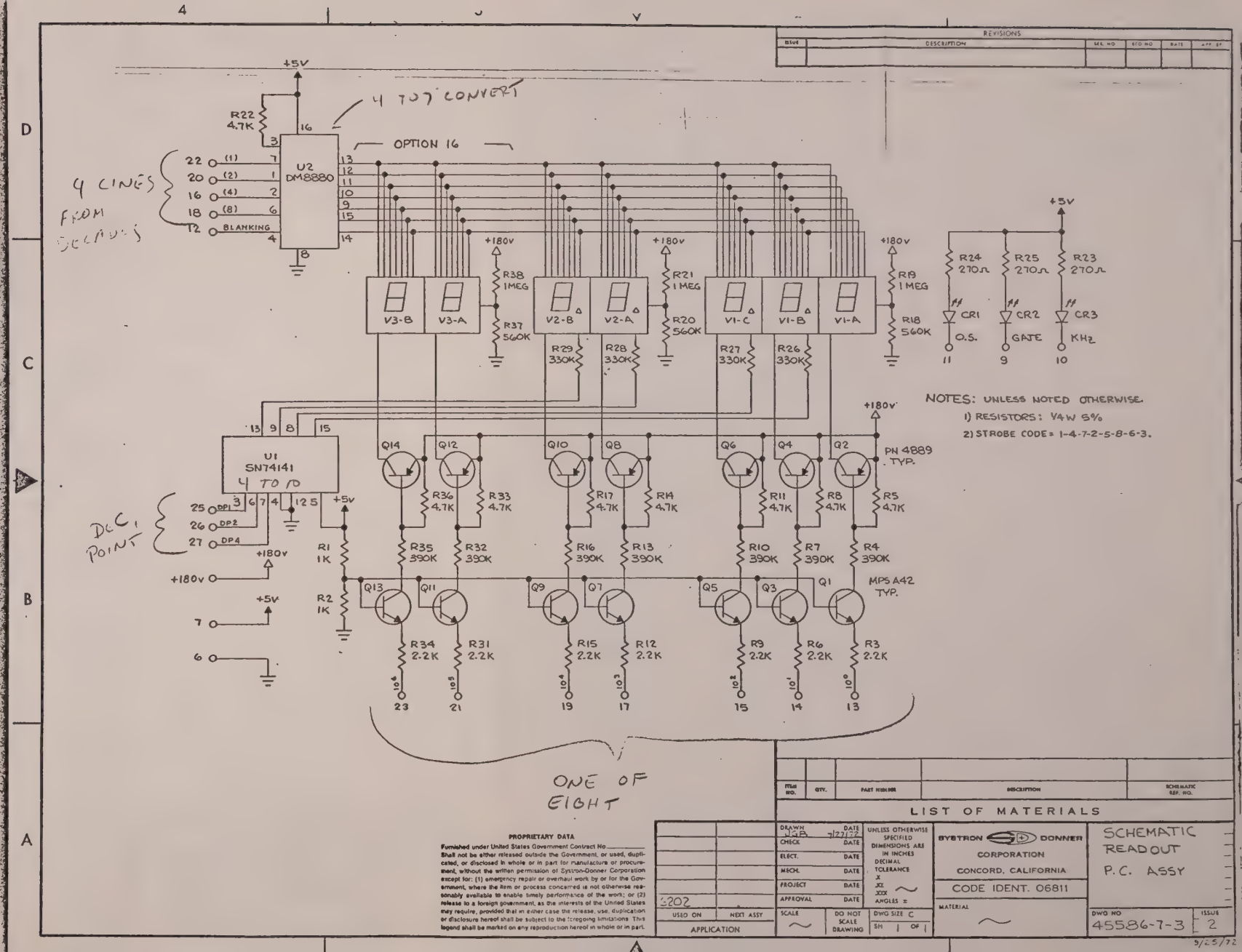

REVISIONS

ECN#	DESCRIPTION	ENG NO	ECO NO	DATE	APP BY

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION	SCHEMATIC REF. NO.

LIST OF MATERIALS

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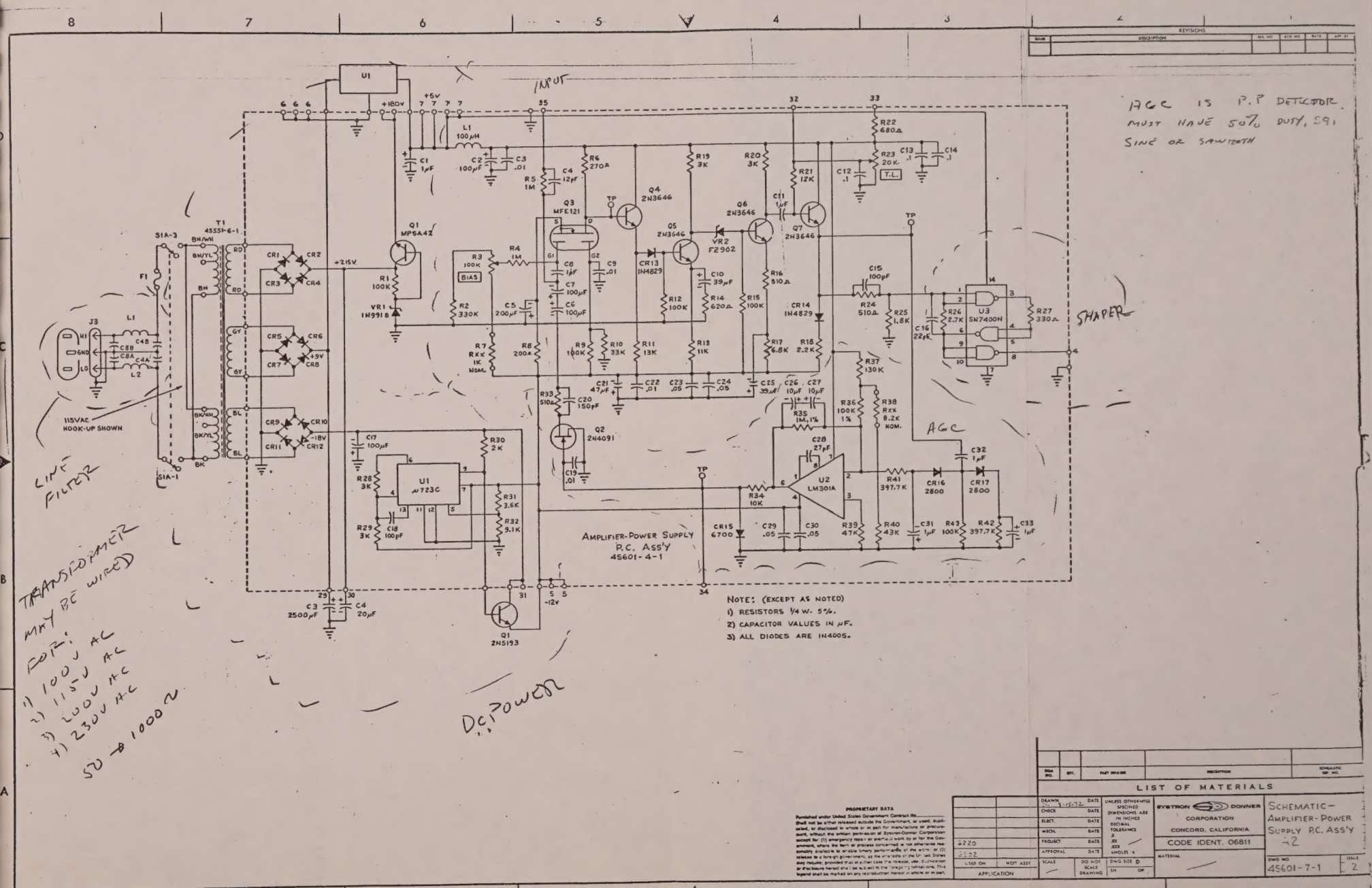
DRAWN JGB	DATE 7/27/72	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES DECIMAL TOLERANCE X ±.01 XXX ±.005 ANGLES ±	SYSTRON DONNER CORPORATION CONCORD, CALIFORNIA
CHECK	DATE		
ELECT.	DATE		
MECH.	DATE		
PROJECT	DATE		
APPROVAL	DATE		
3202			CODE IDENT. 06811
USED ON	NEXT ASSY		
APPLICATION			
SCALE ~	DO NOT SCALE DRAWING	DWG SIZE C SH 1 OF 1	MATERIAL ~

SCHEMATIC READOUT P.C. ASSY

DWG NO 45586-7-3 ISSUE 2

9/25/72


AGC IS P.P DETECTOR
MUST HAVE 50% DUTY, SQ
SINE OR SAWTOOTH
INPUT
SHAPER
AGC
LINE FILTER
115VAC HOOK-UP SHOWN
TRANSFORMER MAY BE WIRED FOR: 1) 100V AC 2) 115V AC 3) 200V AC 4) 230V AC
50 @ 1000 Ω
DC POWER
AMPLIFIER-POWER SUPPLY P.C. ASS'Y 45601-4-1
NOTE: (EXCEPT AS NOTED)
1) RESISTORS 1/4 W. 5%.
2) CAPACITOR VALUES IN µF.
3) ALL DIODES ARE IN4005.
LIST OF MATERIALS
SCHEMATIC - AMPLIFIER-POWER SUPPLY P.C. ASS'Y
45601-7-1
CODE IDENT. 06811
CORPORATION CONCORD, CALIFORNIA

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